In a paper read at the last meeting of the Librarians' Association, Mr. J. R. Boosé describes the progress of Colonial public libraries. Commencing with those in the Dominion of Canada, he stated that as far back as 1779 there was a public circulating library at Quebec. He then traced the progress of the public library system up to the present, giving a detailed account of the Parliamentary Library at Ottawa, and also referring to the recent establishment of free public libraries. He then traced the progress made in the Australasian colonies, dealing separately with the libraries of Victoria, and stated that the establishment of public libraries in those colonies only dated from the second decade of the present century. Their growth, however, had been of extraordinary rapidity; the statistics for Victoria showed that there were 143,073 volumes in the public library of Melbourne, 317,295 in the libraries of the colony, and that these institutions were visited in 1883 by 3,100,000 persons. Mr. Boosé, after describing the libraries of the other Australian colonies, referred to those of the Cape Colony, Natal, Singapore, Jamaica, British Guiana, Trinidad, the Bahamas, &c., and, in conclusion, observed that it was scarcely possible to overrate the advantages of these institutions, inasmuch as, in addition to their existing collections of books, every effort was made to enrich them by such valuable works of reference as were too costly to be purchased privately, and were only presented to libraries having a recognised status. He thought therefore that the Colonial Governments should provide means annually for their proper maintenance, and not throw the cost of them on the municipal authorities.

THE additions to the Zoological Society's Gardens during the past week include two Barbary Apes (Macacus inuus) from North Africa, presented respectively by Mrs. Allison and Mrs. D. Fox Tarratt; two Common Marmosets (Hapale jacchus) from Brazil, presented by Col. Howell Davis; two Brown Bears (Ursus arctos) from Russia, presented by Mr. Walter Holdsworth; two Bandicoot Rats (Mus bandicota) from India, presented by Col. C. S. Sturt, C.M.Z.S.; an American Robin (Turdus migratorius) from North America, presented by Mr. H. Keilich; two Partridges (Perdix cinerea), British, presented by Mr. H. J. Snelgrove; an Azara's Fox (Canis azara) from South America, a Pleasant Antelope (Tragelaphus gratus ?) from West Africa, six Common Chameleons (Chamæleon vulgaris) from North Africa, purchased; a Japanese Deer (Cervus sika &), three Canadian Beavers (Castor canadensis), a Chiloe Wigeon (Mareca chiloensis), seven Australian Wild Ducks (Anas superciliosa), bred in the Gardens.

### OUR ASTRONOMICAL COLUMN

The Periodical Comets of De Vico and Barnard.—As was first pointed out by Prof. Weiss, there is a certain degree of resemblance between the elements of the comet discovered by Barnard in July, 1884, and those of the comet of short period detected by De Vico in August, 1844, which Leverrier considered was probably identical with the comet observed by Lahire at Paris in 1678, though not known to have been seen in the long intervening period. It appears from Brünnow's minute investigation of the orbit of De Vico's comet that the mean motion at perihelion passage in 1844 is not determinable from the observations within very narrow limits, as might rather have been expected, considering the degree of precision with which that comet was observed from the beginning of September to the end of December, Mr. Otto Struve's observations in particular being of remarkable excellence. According to Brünnow's later calculations, the results of which were published in his "Ann Arbor Notices," the mean motion was close upon 650" daily, but he considered that it might be as small as 640" or as large as 660", or, in other words, that the period of revolution at perihelion passage in September, 1844, might be as long as 2025 days, or it might not exceed 1964 days. Dr. Berberich finds the period of Barnard's comet 1959 days, and Mr. Egbert, of Albany, U.S., 1970 days, so that the periods of the two

comets are pretty accordant; but the interval 1844-1884 does not correspond thereto, and the differences that exist in the other elements, notwithstanding the general similarity remarked by Weiss, point to considerable perturbation in this interval, supposing the identity of the comets. De Vico's comet in the orbit of 1844 could not have approached near to the planet Jupiter, to which body we are accustomed to look, as the great disturber of cometary orbits, but there is the possibility of a very close approach to the planet Mars, and this is also the case in a striking degree with Barnard's comet, which, in Dr. Berberich's last ellipse, is less than 0.008 of the earth's mean distance from the orbit of Mars in about 350° 50' heliocentric longitude; as already pointed out in this column, there may have been a close approach of the two bodies at the end of 1873 or beginning of the following year. The nearest approximation of the orbits of 1844 and 1884 is 0.043 in heliocentric longitude 310°, and there is another approximation, 0.065, in 143°. At present, however, the identity of the comets of De Vico and Barnard is to be regarded as at least doubtful

The Double-Star 19 (Hev.) Camelopardi.—The annual proper motion of the principal component of this double-star, which is \$2634, resulting from a comparison of Groombridge's Catalogue (mean year of observation 1808'4) with the Greenwich Catalogue of 1872, appears to be -0"297 in right ascension, and +0"164 in declination, the accurate trigonometrical formula being employed. For the relative motion of the smaller component with respect to the principal one, we may compare Struve's epoch for 1834 with a mean of the measures of Dembowski, Flammarion, and Asaph Hall between the years 1875 and 1879, viz.—

1834'15 ... Pos.  $34^{8}$ :57 ... Dist.  $34^{9}$ 042
1877'29 ... , 1'11 ... ,, 20'303.
Whence we find for the annual relative motion in right ascension

Whence we find for the annual relative motion in right ascension + 0".858 and in declination - 0".302, and we have thus a confirmation of the opinion expressed by M. Flammarion in his "Catalogue des Étoiles Doubles et Multiples en Mouvement relatif certain," that the smaller component has a real motion, more rapid than that of the principal star, of contrary sign, and not far from parallel to it.

A DAYLIGHT OCCULTATION OF ALDEBARAN.—On July 9, civil reckoning, Aldebaran will be visibly occulted in this country about noon. If the distribution formulæ of Littröw and Woolhouse are applied, the following expressions result for finding the Greenwich mean times of disappearance and reappearance, and the angles from north point—

Disappearance ... July 8, 23h. 26'7m. - [0'2369] L + [9'5144] M
Reappearance ... July 9, oh. 15'3m. + [9'1126] L + [9'4189] M
Angle at Disappearance 49° 3 + [0'542] L - [8'004] M
,, Reappearance 321' 6 - [0'528] L - [8'701] M

Here the latitude of the place is put  $=50^{\circ}+L$ , and M is the longitude in minutes of time, positive towards the east. If we apply the formulæ to Oxford, we have  $L = +1^{\circ}.76$ , and M = -5.043 m., and hence

Disappearance, July 8, 23h. 22 om. at 55°. Reappearance July 9, oh. 14 2m. at 316°.

It should be added that the above quantities within square brackets are logarithms.

# ASTRONOMICAL PHENOMENA FOR THE WEEK, 1885, JUNE 28 TO JULY 4

(For the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on June 28

Sun rises, 3h. 48m.; souths, 12h. 2m. 58'7s.; sets, 20h. 18m.; decl. on meridian, 23° 16' N.; Sidercal Time at Sunset, 14h. 46m.

Moon (one day after Full) rises, 19h. 58m.\*; souths, 0h. 27m.; sets, 4h. 58m.; decl. on meridian, 18° 1 S.

| Planet  | R     | ises |  |    |    |  |      | Decl. on meridian |       |    |    |    |
|---------|-------|------|--|----|----|--|------|-------------------|-------|----|----|----|
|         | h.    | m.   |  | h. | m. |  | h.   | m.                |       | 0  |    |    |
| Mercury | <br>3 | 43   |  | 12 | 8  |  | 20 3 | 33                |       | 24 | 33 | N. |
| Venus   | <br>4 | 56   |  | 13 | 8  |  | 21 2 | 20                |       | 22 | 55 | N. |
| Mars    | <br>1 | 50   |  | 9  | 53 |  | 17 5 | 56                |       | 21 | 25 | N. |
| Jupiter | <br>8 | 45   |  | 15 | 50 |  | 22 5 | 55                | • • • | 11 | 45 | N. |
| Saturn  | <br>3 | 19   |  | 11 | 29 |  | 19   | 39                |       | 22 | 31 | N. |
|         |       |      |  |    |    |  | 41   |                   |       |    |    |    |

\* Indicates that the rising is that of the preceding day.

#### Occultations of Stars by the Moon

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as are visible at Greenwich.

| June  | Star           | Mag.         | Disap.                 | Reap.       | Corresponding<br>angles from ver-<br>tex to right for<br>inverted image |   |  |  |  |
|-------|----------------|--------------|------------------------|-------------|---|---|--|--|--|
|       |                |              |                        | h. m.       | 0 0   |   |  |  |  |
| 30    | 13 Capricor    | ni 6         | . 0 0 .,               | . I 7       | 119 239   |   |  |  |  |
|       |                |              |                        |             | 158 233   |   |  |  |  |
| July  |                | _            |                        |             |   |   |  |  |  |
| 2     | B.A.C. 777     | 4 6          | 2 37                   | . 3 59      | 99 302  |   |  |  |  |
|       | Phe            | nomena of    | Jupiter's S            | atellites   |   |   |  |  |  |
| June  | h. m           | _            | July                   | h. m.       |   |   |  |  |  |
| 29    | . 20 26 I.     | tr. ing.     | 2                      | 22 35 I     | II. occ. reap.  |   |  |  |  |
|       | 22 46 I.       | tr. egr.     | 3 20 28 IV. ecl. reap. |             |   |   |  |  |  |
| 30    | . 20 56 I      | ecl. reap.   |                        |             | _   |   |  |  |  |
| The O | ccultations of | Stars and Ph | enomena of             | Iupiter's S | atellites are such  | 1 |  |  |  |

July 3, 23h.—Sun at greatest distance from the Earth, the distance being one-sixtieth part greater than the mean distance.

#### GEOGRAPHICAL NOTES

THE Royal Geographical Society have decided to send out another African expedition. This time the region to be explored is one of more than usual interest, and the method of procedure will be considerably different from that which has been hitherto usually followed. We have had many lines run through Africa in all directions, and what is now needed is the leisurely study of the continent in detail. This is what will be done by the expedition which will leave England in August next, under Mr. T. Last, who, as a lay agent of the Church Missionary Society, has done admirable work in the Zanzibar interior. Mr. Last, after making up his caravan at Zanzibar, will proceed south to Lindi, to the north of the mouth of the Rovuma River. Thence he will proceed to the confluence of the Rovuma and Lutende Rivers, and fix the longitude of the junction—an important geographical point not yet settled. He will then go on in a generally south-westerly direction, and, before reaching the north end of Lake Shirwa, turn southwards and make for the Namulli Hills, which, with other new features in this region, were discovered by Consul O'Neill in the end of 1883. Here Mr. Last will establish himself and make a detailed study of the whole region in all its aspects. He will make a complete survey of the surrounding country, its topography, its people, its botany, economic products, climate, and languages. When this is completed Mr. Last will enter the valley of the Likugu River, which rises in the neighbourhood of these hills, and follow it down to the coast of Quizungu, whence he will travel south to Quilimane or north to Angoche, and thence to Mozambique. Mr. Last will make a special point of collecting all possible information concerning the country he passes through, its changes; its people, their customs, languages, &c.; the climate, its sanitary conditions, and its suitability for the introduction of European and other economic plants.

THE last number of Petermann's Mittheilungen contains the conclusion of Herr Schunke's account of Kaffraria and the eastern borderlands of Cape Colony; the Panama Canal, with a map, by the Editor; the German possessions on the Slave coast, also with a map, by Herr Langhans; the latest explorations in Costa Rica, by Dr. Polakowsky. This last is specially interesting. It is a continuation of a paper, published two years ago, and describes ten additional journeys to various parts of Costa Rica by Dr. Thiel the bishop. It is unfortunate for science that this ecclesiastic, whose energy in educating his flock and whose thirst for scientific investigation are alike remarkable, should have been expelled by the Costa Rican Government, and that in such haste that he was compelled to leave behind him all his journals, collections, scientific observations, &c. He travelled and lived much amongst the various tribes of Indians, and studied their dialects, the antiquities, and ethnology of the country. He is at present visiting the eastern coasts of Nicaragua and Honduras in order to collect Indian antiquities and the remnants of Indian languages. The same paper also contains a report of a journey in Costa Rica by Padre

A CORRESPONDENT writes to Ausland from Santiago to correct a mistake as to a reported discovery of a glacier in Chile. The glacier in question is called the Ada glacier, and occupies the upper end of the Cajon de los Cipreses, a branch of the valley of Cachapual. In a note which appeared in the fourth

number of Ausland this year and was copied from the Proceedings of the Royal Geographical Society, the discovery of this glacier was attributed to Dr. Güssfeldt. Some years previously the same discovery had been ascribed to Mr. Charles Wiener. The fact is, the correspondent states, the glacier has been known to the visitors to the baths of Cauquenes for the last twenty years at least. MM. Wiener and Güssfeldt, like other visitors to the baths, had had their attention called to it, and each in turn was consequently credited with its discovery.

THE French Minister of Public Instruction has published a report which he has received from M. Chaffanjon, a professor in Guadeloupe, giving an account of his mission on the Orinoco. In order to investigate fully the hydrography of the river he has often found it necessary to travel far away from the banks on both sides, and he has thus been able to survey the former beds. He has also obtained the materials for a geological map of the region and for a description of the phenomena attending the formation of this part of the earth's crust. Hitherto we have had only vague ideas respecting the Indian races, because they were without history or ancient remains. Prof. Chaffanjon has discovered in five different places inscriptions and pictures in granite, which he has carefully copied. He has collected a crowd of ethnological objects amongst the Caribs, the Panaies, and the Mapoyes. He hopes also to be able to fill certain gaps in the zoological and botanical collections in the Paris Museum. The report is accompanied by a sketch on a scale of 1 to 660,000 of the course of the Orinoco between Caicara and Ciudad Bolivar, which gives a considerable number of names new to geography.

THE Berlin Geographical Society has decided to erect a monument at the burial place of the late Dr. Nachtigal, at Cape Palmas, and all Germans are invited to send contributions to the fund for this purpose.

## ELECTRICAL DEFINITIONS, NOMENCLATURE, AND NOTATION1

WITH the rapid progress that has lately been made in electrical science and its applications, there has sprung up a new and fast-increasing class of practical electricians. These, partly from necessity and partly from well-meant respect, have adopted and applied the old terms and expressions which appeared suitable to their predecessors, as well as coined not a few new ones, until now their vocabulary is in considerable confusion, and, as all must admit, requires sifting and reform.

Nothing is more tantalising and perplexing than the different modes of expression and symbols used by different authors, and sometimes by the same author, to explain and interpret one and the same thing or result. All this might be avoided if an international system of definitions, nomenclature, and notation was agreed upon and legalised. The rapidity with which the new definitions of the ohm, ampere, and volt (issued and legalised last spring at Paris by the International Congress of Electricians) were universally adopted, shows this. These definitions should be still further extended to other electrical units. should embrace a suitable system of notation, whereby electrician could represent in symbols and letters, terms, expressions, and formulæ of common occurrence, in a similar manner to that adopted by chemists in connection with chemical elements and their combinations. Last session the author promised a communication to the Society on this subject, and, being again reminded by the Secretary of his unfulfilled promise, he now submits a few of the more apparent instances where ambiguity or want of uniformity exists, with suggestions, in the hope that a discussion may follow, and that a Committee of this Society may be formed to consider and draw up a series of definitions, nomenclature, and notation that would be generally acceptable. The proposed Committee might then confer with the French Committee, also with a similar Committee appointed by the British Association, and, finally, this important question should be referred to the International Congress of Electricians, in order that they may legalise and issue their decisions in a similar manner to that adopted by them in the case of the ohm, the ampere, and the volt. Undoubtedly, if such a course were adopted, most beneficial results would accrue to all concerned.

Paper read before the Society of Telegraph Engineers and Electricians on May 14, 1885, by Prof. Andrew Jamieson, C.E., F.R.S.E., Member. Principal, College of Science and Arts, Glasgow.